

Orientation Conclave
Air Quality Management: Building Strategies for Clean Air in Greater Kolkata
Centre for Science and Environment in collaboration with
Department of Environment, Government of West Bengal

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Malba Matters

managing construction & demolition waste

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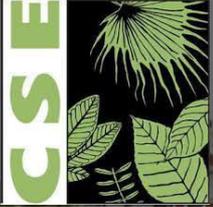
Sustainable Cities Programme, CSE



Construction & Demolition (C&D) waste means “the waste comprising of building material, debris and rubble resulting construction, re-modeling, repair and demolition of any civil structure”

Construction and Demolition Waste Management Rules, 2016

Why is this a concern?





CONCERNS

C&D wastes stored outside construction sites and along road sides are a cause of both **traffic congestion and mishaps**

Waste from small generators quite often finds its way into the nearest municipal bin, waste storage depots, making the municipal waste heavy and degrading its quality for further treatment like composting or energy recovery

C&D waste is also often dumped in surface drains obstructing the flow of waste water leading to **urban flooding**

C&D waste is a source of dust pollution

1. Pattinapakkam Beach



Severing our water bodies



2. Yamuna, Delhi



6. Keelkattalai Lake, Chennai



3. Ram Nadi, Pune



4. Mangroves, Navi Mumbai



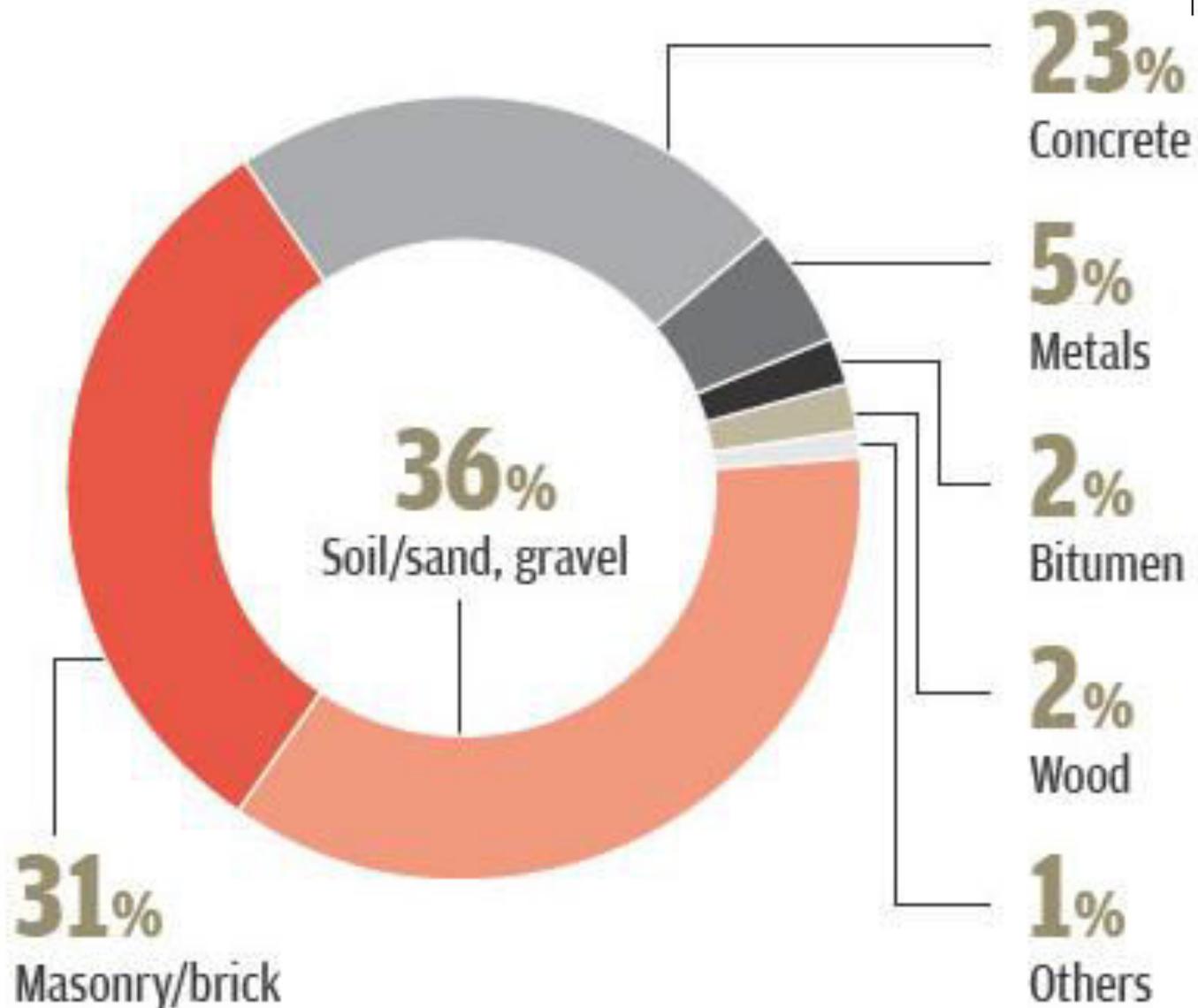
7. Coimbatore



5. NRI Complex, Mumbai



Composition of construction and demolition waste in India as per Technology Information, Forecasting and Assessment Council





Sand Mining
It is killing our rivers twice



As waste lies waste... nature is devastated to support urban boom

Sand mining triggers debate

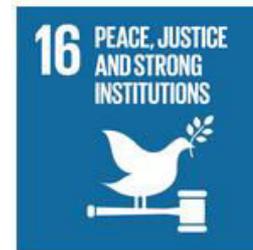
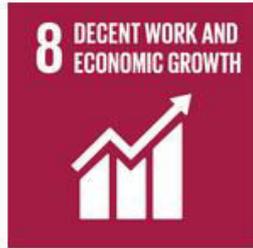
2012: Supreme Court order on stronger regulations for minor minerals

2013: National Green Tribunal declared sand mining with environmental clearance illegal.

Union Ministry of Housing and Urban poverty alleviation alerted Rajya Sabha in 2012 about the shortage of building material especially aggregates. Holding up housing and civic infrastructure projects...

Need substitutes and strategies to reduce stress on naturally sourced material

Resource scarcity is a theme in the Sustainable Development Goals





12.2 By 2030, achieve the sustainable management and efficient use of natural resources

12.4 By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment

12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse

12.b Develop and implement tools to monitor sustainable development impacts for sustainable tourism that creates jobs and promotes local culture and products



How much more do we need to continue building?

The demand of building materials for 2021-22 has been reckoned by Building Materials and Technology Promotion Council (BMTPC) as cement **380 million tonne**, steel **50 million tonne**, bricks **600 billion numbers**, aggregate **400 million cubic meters** and timber **40 million cubic meters**.

But,
How big is the waste problem?

“No estimates or even guesstimates exist for construction and demolition waste” in the country

Comptroller and Auditor General of India 2008

No one really knows



Year	Authority/Institute	Estimate (million tonnes)
2000	Ministry of Urban Development	10-12
2001	Technology Information, Forecasting and Assessment Council , Department of Science and Technology	12-15
2010	Ministry of Environment and Forest	10-12
2013	Centre for Science and Environment	530
2014	Ministry of Urban Development	No estimates exist
2015	Ministry of Urban Development	10-12
2015	Development Alternative and GIZ	750
2016	Ministry of Environment, Forest and Climate Change	530
2017	Building Material and Technology Promotion Council	150

GUESSING the ESTIMATES



According to TIFAC estimates:

New construction generates about 40-60 kg per sqm of build up area

Repair and renovation of existing buildings generates 40-50 kg per sqm

Demolition of buildings generate 300-500 kg per sqm

Mckinsey estimates for trend in built up area in India

Based on these CSE guesstimated:

Indian buildings in 2013 have generated more than **530 million tonnes** - 44 times more than official estimates. More than other solid wastes

Additionally astounding amount of waste is generated from infrastructure projects - roads, flyovers, bridges etc



Small steps to make resource from waste

C&D waste can be recycled and reused in construction and minimize environmental degradation and pressure on land. Matured technologies are available.

Small steps in Delhi and Mumbai:

MCD-ILFS-IEISL initiative in Delhi

C&D waste is being recycled into aggregates which are converted to Ready Mix Concrete, pavement blocks, kerb stones and concrete bricks.

YUVA and CIDCO initiative in Navi Mumbai

This has recycled 1500 tonnes of C&D waste between 2002-06. But operations shut down as no policy and market support

Materials recovered from C&D



Mixed Waste



Concrete Waste



Recycled Aggregate (RA)



**Sand Substitute
Aggregate -3mm**

Recycled Concrete Aggregate (RCA)



Aggregate 10-20 mm



Aggregate 3-10 mm



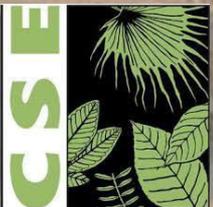
Aggregate 3-10 mm



Aggregate 10-20 mm



Pavement Blocks and Kerbstones



No takers



What was coming in the way?



Indian standards used to permit only
'naturally sourced' material

No legal framework

Municipal Solid Waste (Management and Handling) Rules 2000 only made a brief mention of C&D waste without laying down any guidelines for its management.

No standards for recycled products

The BIS allows use of non-natural materials to be used for construction but doesn't have any specific standard for recycled material, leading to major confusion among various agencies and developers. Most are abstaining from using recycled waste citing Indian standard specification related to aggregates for concrete state that these should be '*naturally sourced*'.

- Only virgin materials (sand, aggregate) mined directly from nature can be used. This does not allow recycled or reused components
- Any use of recycled aggregate become 'illegal'

**State construction agencies could not include these material
in their Schedule of Rates**



2016 Amendment of IS:383

Coarse and Fine Aggregate for Concrete

(Clause 4.2.1)

		Maximum utilization in		
		Plain Concrete	Reinforced Concrete	Lean Concrete (less than M15 grade)
1) Coarse Aggregate				
i)	Iron slag aggregate	50%	25%	100%
ii)	Steel slag aggregate	25%	Nil	100%
iii)	Recycled concrete aggregate (RCA) (See Note 1)	25%	20% (only upto M20 grade)	100%
iv)	Recycled aggregate (RA)	nil	nil	100%
2) Fine Aggregate				
i)	Iron slag aggregate	50%	25%	100%
ii)	Steel slag aggregate	25%	nil	100%
iii)	Copper slag aggregate	40%	25%	50%
iv)	Recycled concrete aggregate (RCA) (See Note 1)	25%	20% (only upto M20 grade)	100%

National Building Code of India 2016



Part 11 of NBC 2016 on 'Approach to Sustainability', states that :

- a. Recycled Coarse Aggregate may be used in concrete for bulk fills, bank protection, base/fill of drainage structures, pavements, sidewalks, kerbs and gutters etc.
- b. Up to 30 percent of natural crushed coarse aggregate can be replaced by the recycled concrete aggregate
- c. This percentage can be increased up to 50 percent for pavements and other areas which are under pure compression

Further support

Exemption from the compliance of norms (Schedule I (14))

The following are exempted from the norms of pollution from dust and noise as mentioned above:

- a. For construction work, where at least 80 percent construction and demolition waste is recycled or
- b. reused in-situ and sufficient buffer area is available to protect the surrounding habitation from any adverse impact.

Construction and Demolition Waste Management Rules, 2016



This was urgently needed as cities are choking on construction and demolition waste with serious environmental and public health consequences

The next step is to create a clear mechanism for stringent and scaled-up implementation in cities for improved collection, segregation and handling of waste; decentralised collection and recycling centres; penalty for littering; lower taxes on recycled products and public awareness

Make developers responsible and accountable for good construction practices, onsite segregation of waste, reuse and disposal; and impose waste tax to minimize waste-generation.

The key highlights of the new C&D Rules



The key highlights of the new notification on C&D waste:

- Mandates use of recycled of products in construction, Local bodies will have to **utilise 10-20 per cent of material from C&D waste** in municipal and government contracts for construction
- All large developers are **accountable for collection and disposal** of C&D waste
- The Bureau of Indian Standards needs to prepare a code of practice and standards for products of construction and demolition waste
- Indian Road Congress needs to prepare standards and practices pertaining to products of construction and demolition waste in road construction
- Local authorities to give **appropriate incentives to waste generators** for salvaging, processing, and recycling, preferably in-situ
- Recycling facilities will have to be created at a safe distance from habitation with adequate buffer zone
- Local authorities to **established a database and update** it once in a year

Waste generator responsibilities



- Submit a waste management plan to the local authorities before starting construction
- Inform the authorities of every construction and demolition activity from planning to implementation stage. (Processing and disposal charges to be done)
- Generating more than 20 tons/day or 300 tons/project of C&D waste in a month - **segregation into streams:** concrete, soil, steel, wood and plastics, bricks and mortar
- Make sure C&D waste is **not mixed with solid waste** and keep it within premise
- **Pay relevant charges** for collection, transportation and disposal as notified by the concerned authorities. Rates to be fixed by concerned local authority
- Generators of more than 20 tons/ day or 300 tons/ project in a month shall pay separately for processing and disposal



ULBs responsibilities

Cities with population > one million

Bulk generators : The agencies that generate C&D waste in bulk quantity to deliver the C&D debris at the recycling plant

Fee on bulk generators: The terms and conditions with the concessionaire and the fee levied on bulk producer of C&D waste are made available at a price at least 20% lower than corresponding materials from natural resources.

Criteria for setting up C&D waste processing facilities: The Civic bodies wherein current waste generation > than 2000 tpd, to set up more than one plant for recycling of C&D waste

Cities of population < one million

Non-bulk generators : Collection points be provided so that small quantity generator of C&D waste is not required to transport the debris to a distance more than 2.5 to 3.0 km

Mandate use of recycled C&D waste products



- a) Mandate use of C&D waste products : As and when C&D waste recycling plant is commissioned at a city, it may be made mandatory for all construction activities to use a specified percentage of building construction materials manufactured from recycled debris.

- b) Incentivize utilization of recycled C&D waste products :
 - i. All Government constructions may be mandated to use at upto 20 per cent of recycled C&D waste products.
 - ii. All renovation projects involving demolition, even in private sector, may be mandated to use at least 20 per cent of recycled C&D waste products.
 - iii. The tipping fee for delivery of C&D waste to the recycling plant, terms & conditions of civic body with the concessionaire may be designed to keep the price of C&D waste recycled products about 20 per cent lower than the corresponding conventional products.

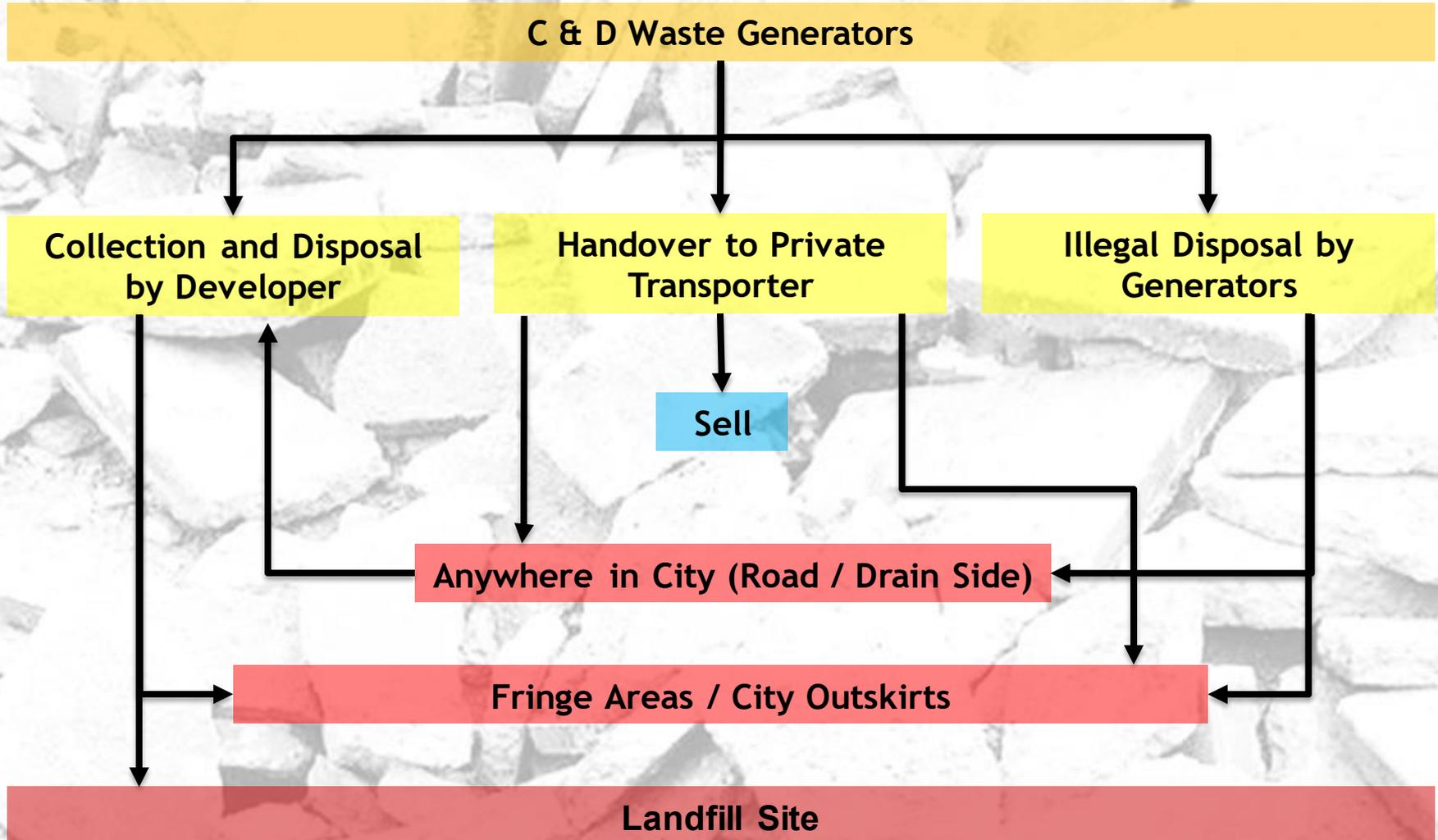
Duties of SPCBs



Monitoring

- Implementation of the rules by concerned local bodies
- **At processing and recycling facilities, local authority shall:**
 - Provide storm water drains to prevent stagnation of surface water
 - Provide paved or concreted surface in selected areas in the processing or recycling facility for minimizing dust and damage to the site.
 - Prevent noise pollution from processing and recycling plant
 - Provide treatment of effluent if any, to meet the discharge norms as per Environment (Protection) Rules, 1986.
- **SPCBs shall:**
 - Monitor Work Zone air quality at the Processing or Recycling site and ambient air quality at the vicinity
 - Measure ambient noise at the interface of the facility with the surrounding area, i.e., at plant boundary.
- **Exemption:** For construction work, where at least 80 percent construction and demolition waste is recycled or reused in-situ and sufficient buffer area is available to protect the surrounding habitation from any adverse impact.
- Annual reporting (before 31st July of each financial year) to Central Pollution Control Board for generation of state level comprehensive data
- Authorization of C&D waste processing facility

Current Scenario



Proposed Scenario

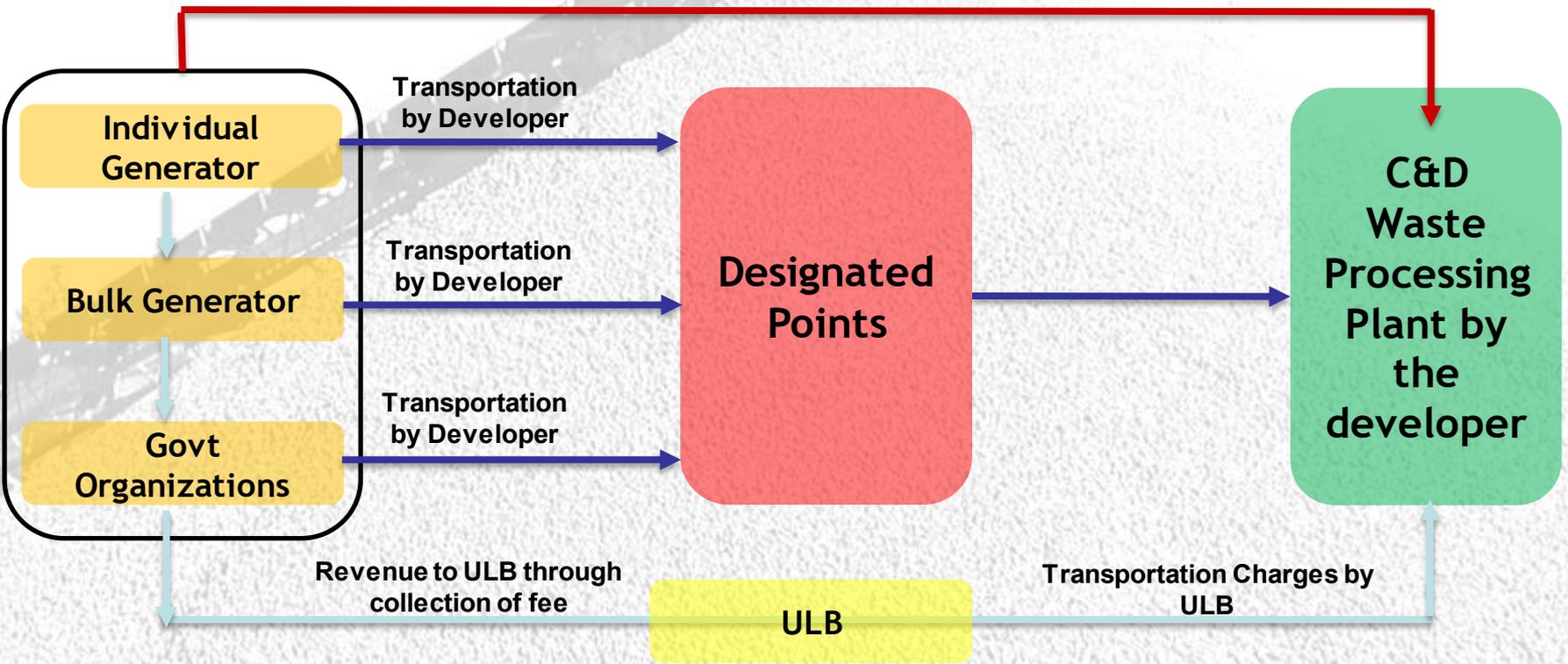


Monitoring Agency:
Urban Local Body

Transportation by developer

→ C&D waste Debris
→ Payment system

→ Direct Transportation of C&D waste Debris



So far



Delhi : has the most developed system in place.

Ahmedabad: has a recycling facility and mandate for city agencies to procure 50% of building material from the recycling facility. But most building professional in the city are unaware of facility and are not sending waste there.

Pune: has amended it's bylaws to introduce c&d waste generation fee as part of building permit system but has no collection or recycling system in place.

Mumbai: illegal dumping of c&d waste in the wetlands prompted High Court to ban all new construction in greater Mumbai. Now city has put in place a safe disposal plan but it just legalised the dumping in wetlands.

Bangalore: has a private c&d waste plant and has amended it's bylaws to address the issue but nothing has happened on ground.

Deconstruct

Deconstruction



CSE Recommends



All cities to frame C&D policy and set up recycling facilities to promote efficient construction management practices to minimise waste. Make all developers liable and accountable

Create a clear mechanism for stringent and scaled-up implementation in cities for improved collection, segregation and handling of waste; decentralised collection and recycling centres; penalty for littering; lower taxes on recycled products and public awareness.

Make developers responsible and accountable for good construction practices, onsite segregation of waste, reuse and disposal; and impose waste tax to minimize waste generation.

Question?



The key highlights of the new C&D Rules

- i. Proper estimation of C&D waste generation
- ii. Initiatives from the local administration / civic bodies
- iii. Identified sites and approval of land for development of integrated C&D processing facilities
- iv. Specifications / standards for recycled C&D waste products
- v. Landfill levy
- vi. Awareness campaign
- vii. List out and mandate use of recycled products from C&D wastes
- viii. Research on economically viable C&D recycling options
- ix. Map all water bodies in a city / region